

TABLE 3 OF § 1048.505—Continued

Mode No.	Engine speed	Torque (percent) <sup>1</sup>	Minimum time in mode (minutes)	Weighting factors
2 .....	Maximum test speed .....	75	3.0	0.50

<sup>1</sup> The percent torque is relative to the maximum torque at maximum test speed.

(ii) The following duty cycle applies for discrete-mode testing:

TABLE 4 OF § 1048.505

RMC modes	Time in mode (seconds)	Engine speed (percent)	Torque (percent) <sup>1 2</sup>
1a Steady-state .....	290	Engine governed .....	100
1b Transition .....	20	Engine governed .....	Linear transition.
2 Steady-state .....	290	Engine governed .....	75

<sup>1</sup> The percent torque is relative to maximum test torque.

<sup>2</sup> Advance from one mode to the next within a 20-second transition phase. During the transition phase, command a linear progression from the torque setting of the current mode to the torque setting of the next mode.

(c) For full-load operating modes, operate the engine at wide-open throttle.

[73 FR 59239, Oct. 8, 2008, as amended at 75 FR 23022, Apr. 30, 2010; 79 FR 23751, Apr. 28, 2014]

#### § 1048.510 What transient duty cycles apply for laboratory testing?

(a) Starting with the 2007 model year, measure emissions by testing the engine on a dynamometer with the duty cycle described in Appendix II to determine whether it meets the transient emission standards in § 1048.101(a).

(b) Calculate cycle statistics and compare with the established criteria as specified in 40 CFR 1065.514 to confirm that the test is valid.

(c) Warm up the test engine as follows before running a transient test:

(1) Operate the engine for the first 180 seconds of the appropriate duty cycle, then allow it to idle without load for 30 seconds. At the end of the 30-second idling period, start measuring emissions as the engine operates over the prescribed duty cycle. For severe-duty engines, this engine warm-up procedure may include up to 15 minutes of operation over the appropriate duty cycle.

(2) If the engine was already operating before a test, use good engineering judgment to let the engine cool down enough so measured emissions during the next test will accurately represent those from an engine starting at room temperature. For example, if an engine starting at room tempera-

ture warms up enough in three minutes to start closed-loop operation and achieve full catalyst activity, then minimal engine cooling is necessary before starting the next test.

(3) You are not required to measure emissions while the engine is warming up. However, you must design your emission-control system to start working as soon as possible after engine starting. In your application for certification, describe how your engine meets this objective (see § 1048.205(b)).

[67 FR 68347, Nov. 8, 2002, as amended at 70 FR 40478, July 13, 2005; 73 FR 59241, Oct. 8, 2008; 75 FR 23023, Apr. 30, 2010]

#### § 1048.515 What are the field-testing procedures?

(a) This section describes the procedures to determine whether your engines meet the field-testing emission standards in § 1048.101(c). These procedures may include any normal engine operation and ambient conditions that the engines may experience in use. Paragraph (b) of this section defines the limits of what we will consider normal engine operation and ambient conditions. Use the test procedures we specify in § 1048.501, except for the provisions we specify in this section. Measure emissions with one of the following procedures:

(1) Remove the selected engines for testing in a laboratory. You may use an engine dynamometer to simulate